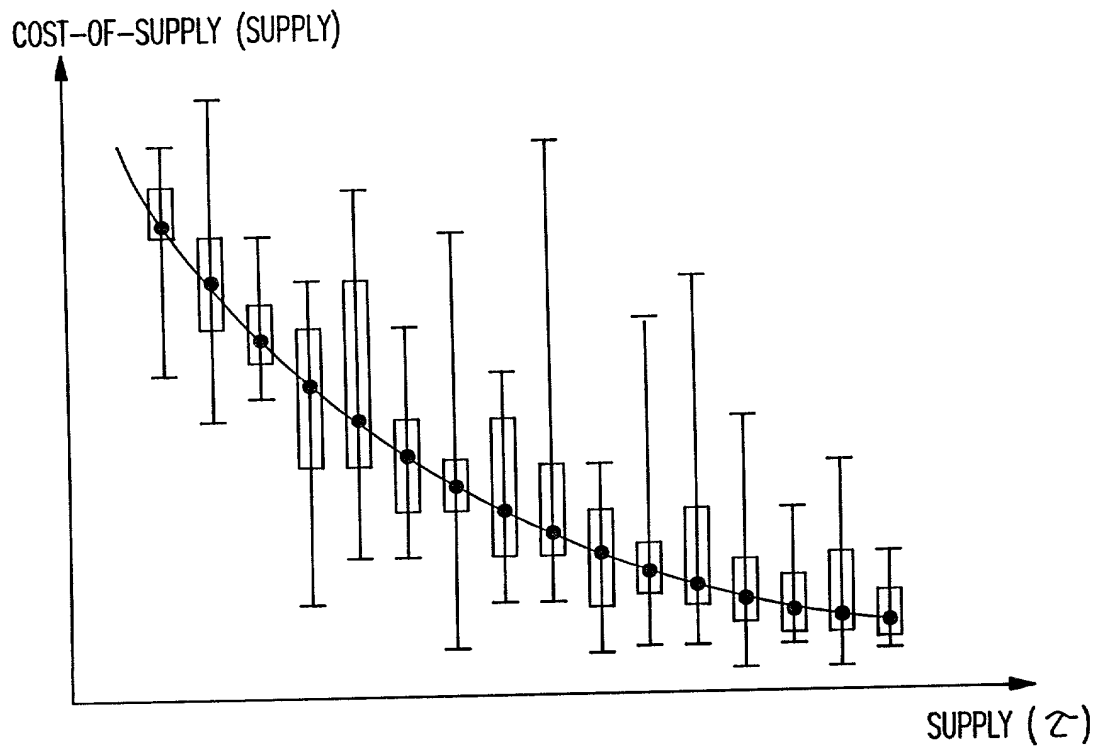
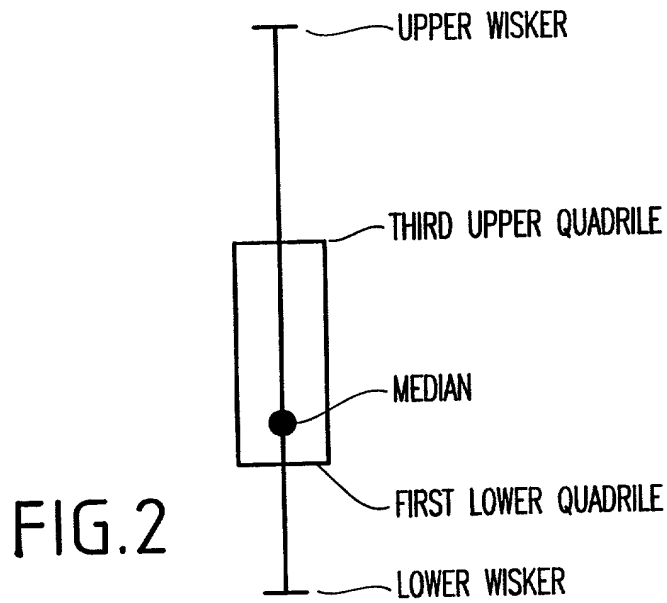


FIG.1



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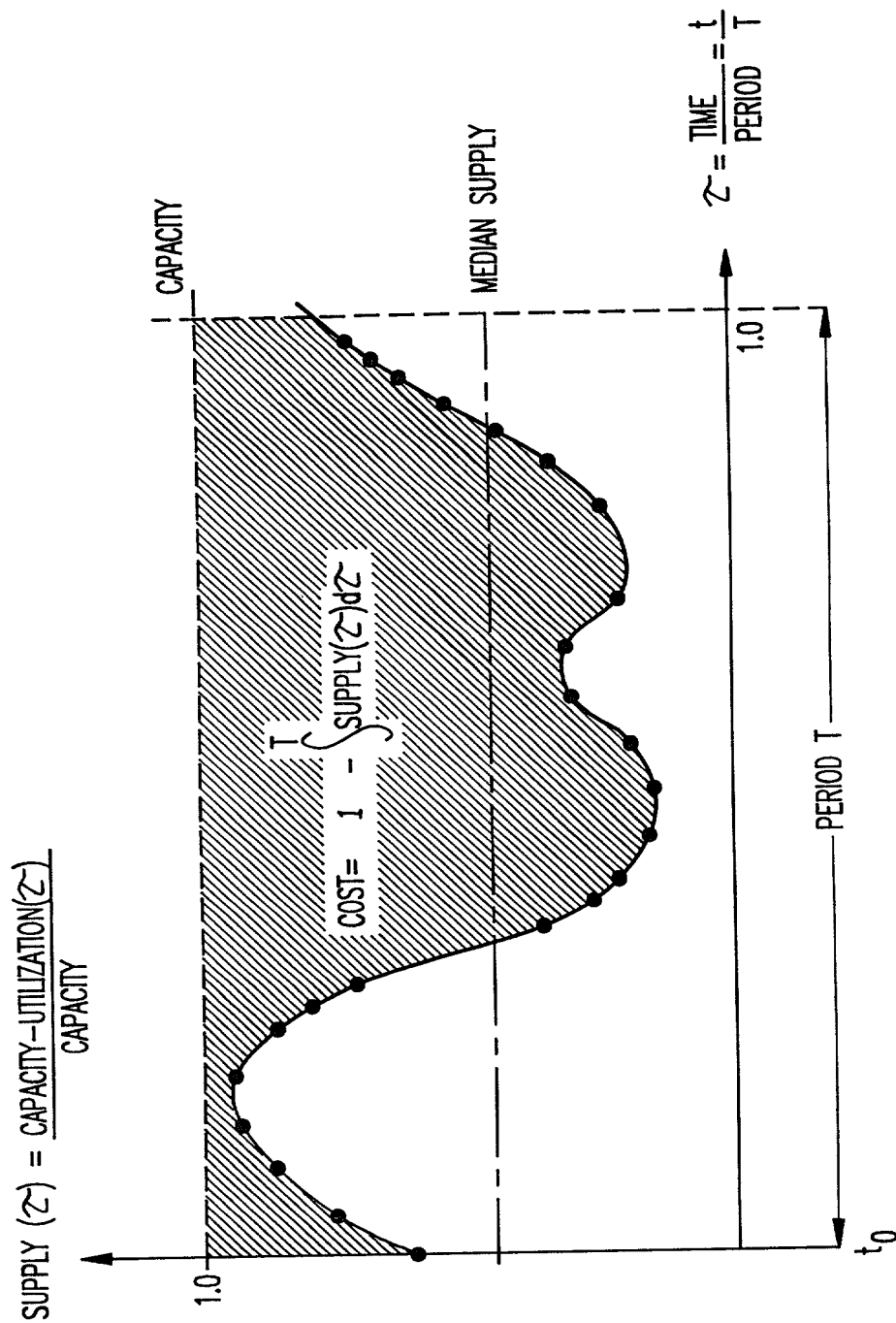


FIG.4

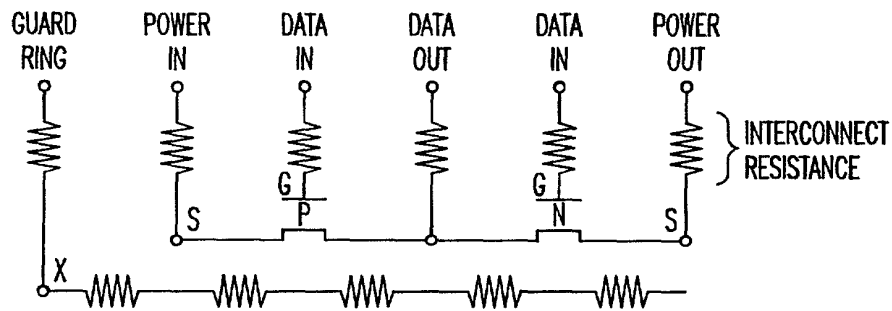
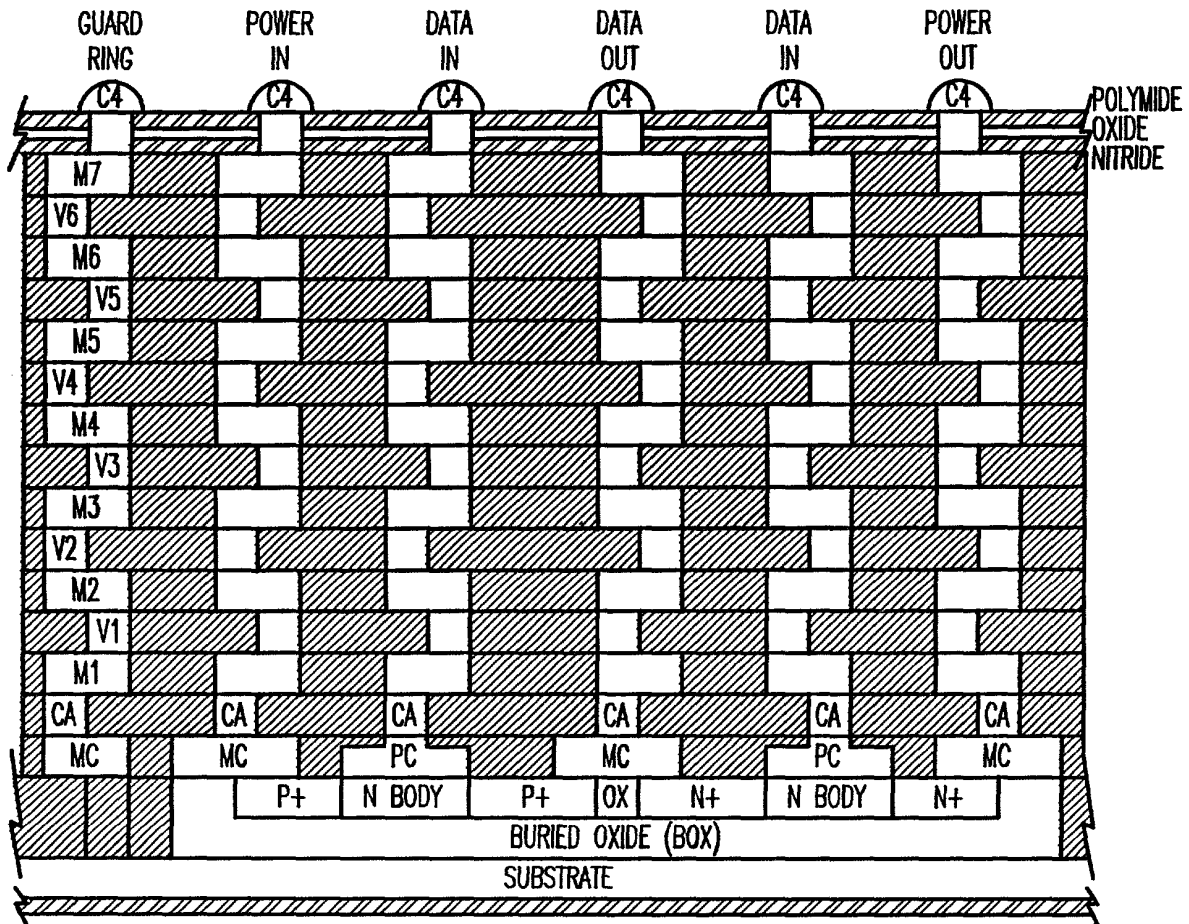


FIG.5

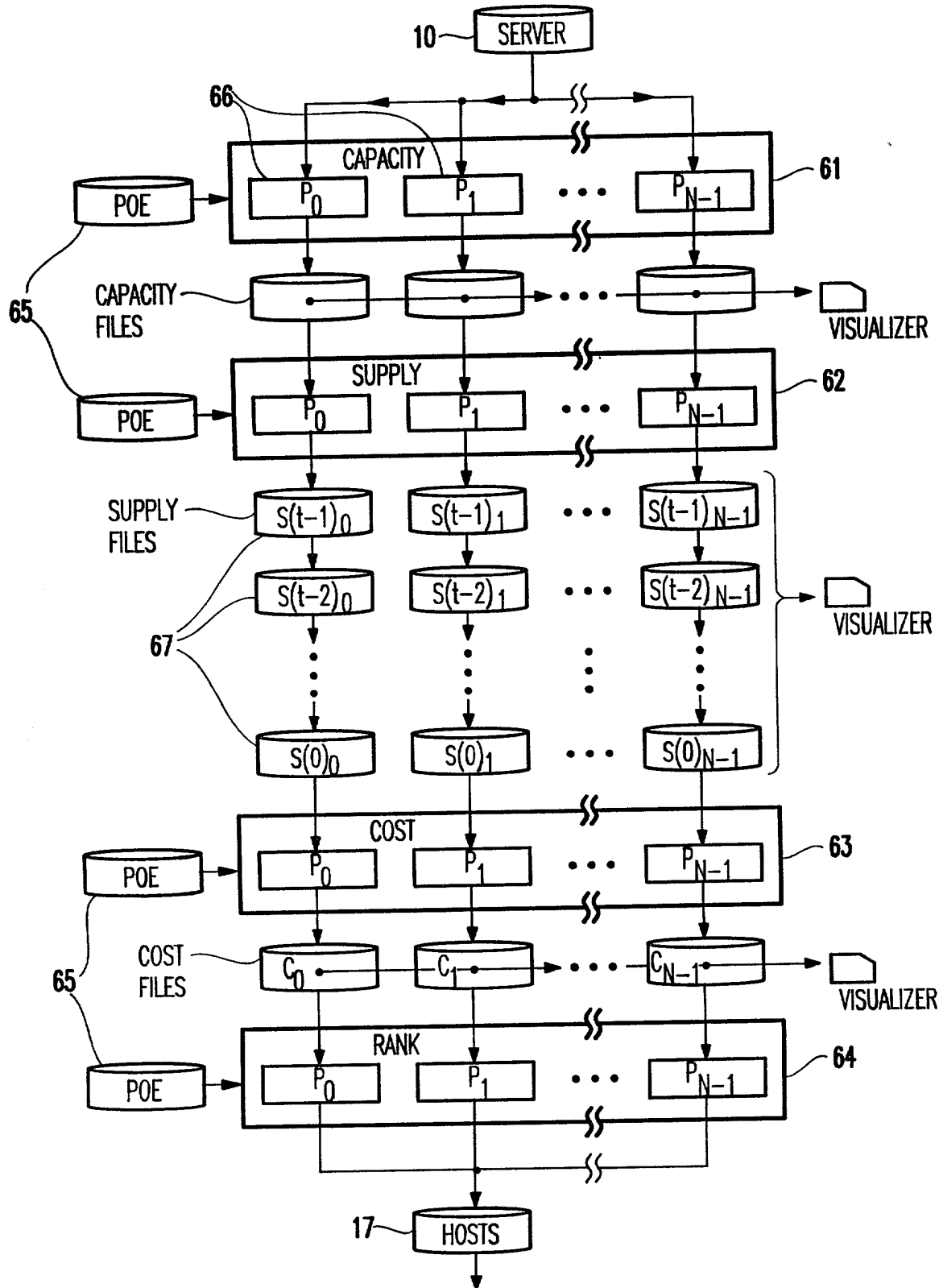
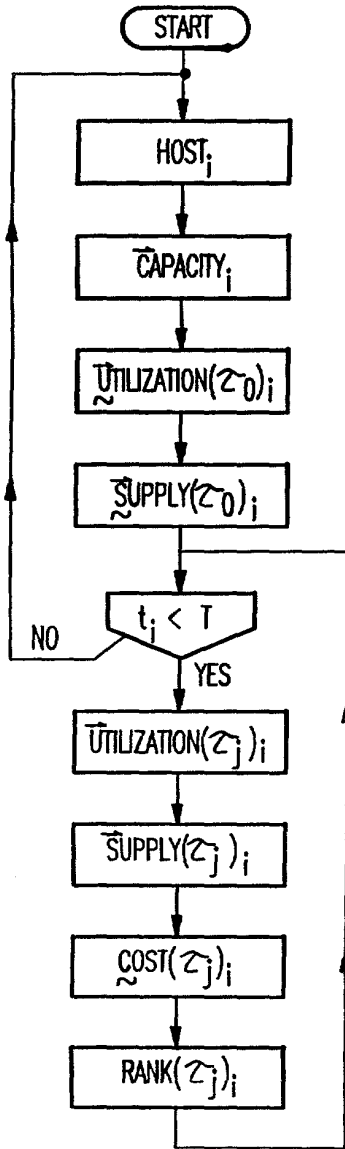


FIG.6



$$\vec{HOSTS}_i \quad \left\{ \begin{array}{l} \text{DIMENSION: } 0 \leq \vec{HOST}(i) \leq \vec{SERVER}(N) \\ \text{UNIT SCALAR} \\ \text{FORM: TIME INDEPENDENT VECTOR}(i) \\ 0 \leq i < M \leq N \end{array} \right. \quad [1]$$

$$\vec{CAPACITY}_i = (\text{CPU, MEMORY, TEMP FILE, CACHE PAGE}); \quad [2]$$

$$\text{WHERE} \quad \left\{ \begin{array}{l} \text{DIMENSIONS: CPU, DATA, DATA, DATA} \\ \text{UNITS: SCALAR, BYTE, BYTE, BYTE} \\ \text{FORM: TIME INDEPENDENT, ix4 MATRIX} \end{array} \right.$$

$$\vec{UTILIZATION}(t_0)_i = (\text{CPU, MEM, TMP, PAGE})(t_0)_i; \quad [3]$$

$$\text{WHERE} \quad \left\{ \begin{array}{l} \text{DIMENSIONS: CPU, DATA, DATA, DATA} \\ \text{UNITS: SCALAR, BYTE, BYTE, BYTE} \\ \text{FORM: TIME DEPENDENT, ix4 MATRIX} \end{array} \right.$$

$$\vec{SUPPLY}(z_0)_i = \vec{CAPACITY}_i - \vec{UTILIZATION}(z_0)_i; \quad [4]$$

$$\text{WHERE} \quad \left\{ \begin{array}{l} \text{DIMENSIONS: CPU, DATA, DATA, DATA} \\ \text{UNITS: SCALAR, BYTE, BYTE, BYTE} \\ \text{FORM: TIME DEPENDENT, ix4 MATRIX} \end{array} \right.$$

$$\text{WHERE } 0 \leq z_j \leq \text{SAMPLING PERIOD } T$$

$$\vec{UTILIZATION}(z_j) \quad [3a]$$

$$\vec{SUPPLY}(\quad)_i = (\vec{CAPACITY}_i - \vec{UTILIZATION}(z_j)_i); \quad [4a]$$

$$\vec{COST}_i = 1 - \int \vec{SUPPLY}(z_j)_i dj; \quad [5a]$$

$$\text{WHERE} \quad \left\{ \begin{array}{l} \text{DIMENSION: NONE, NONE, NONE, NONE} \\ \text{UNITS: SCALAR, SCALAR, SCALAR, SCALAR} \\ \text{FORM: TIME DEPENDENT VECTOR } (t_j)_i \end{array} \right.$$

$$\vec{RANK}(t_j)_i = \text{SORT}[\text{VALUE}(t_j)_i]; \quad [6a]$$

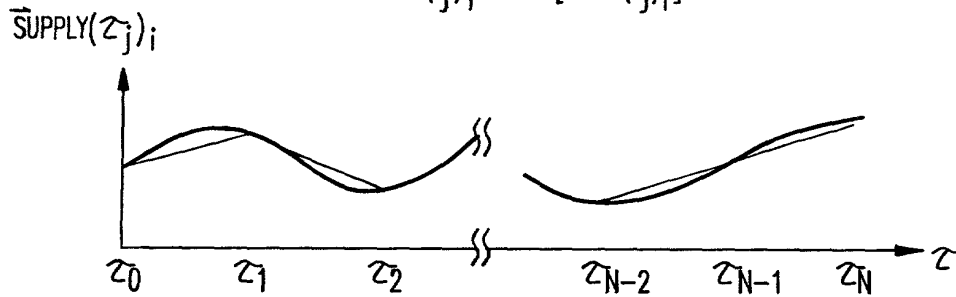


FIG.7

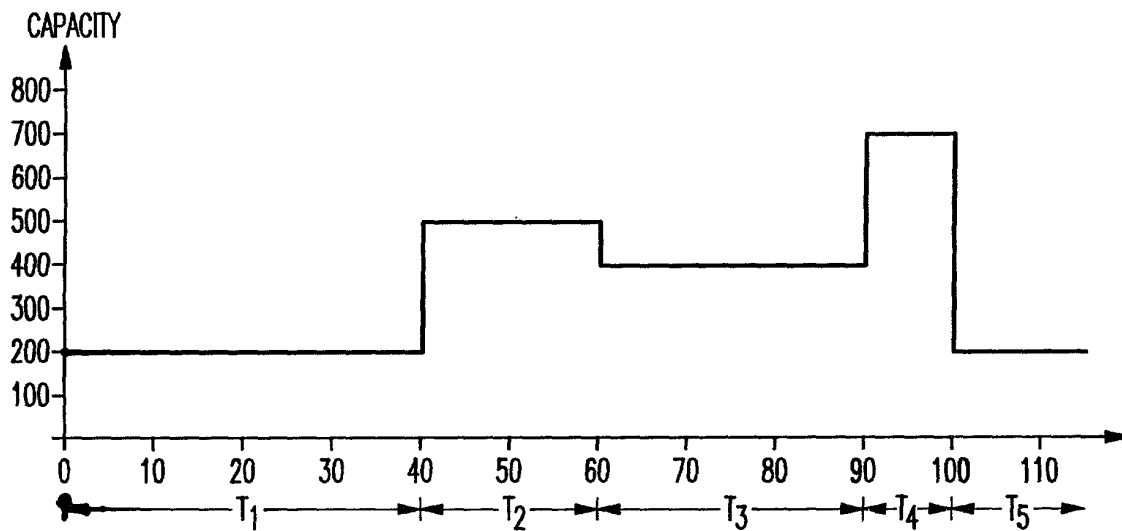


FIG. 7A

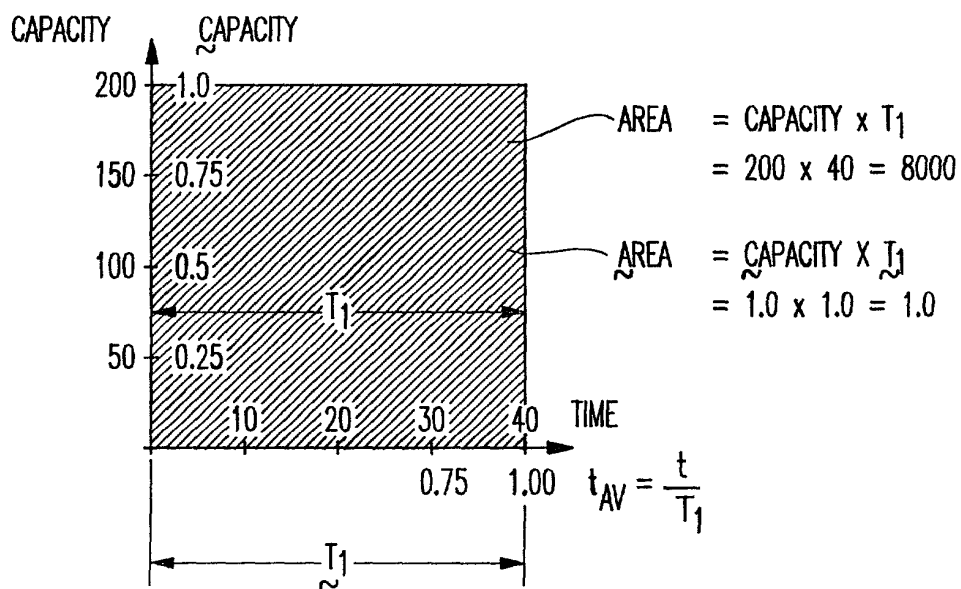


FIG. 7B

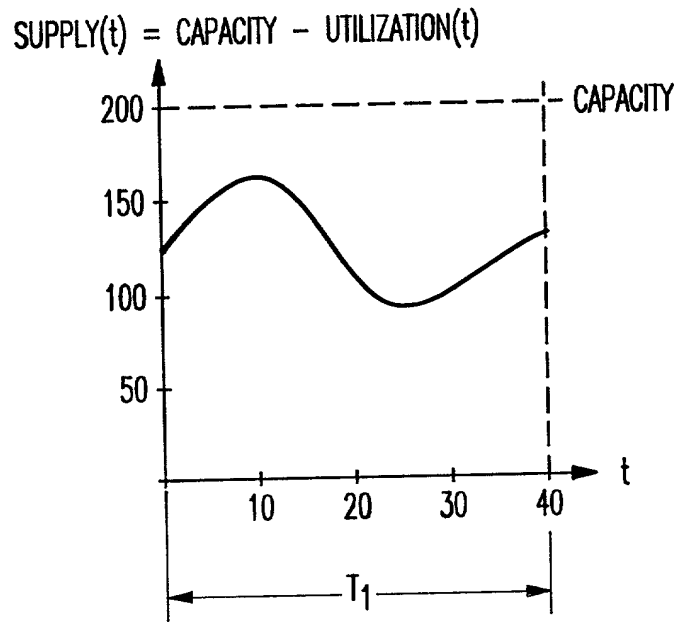


FIG.7C

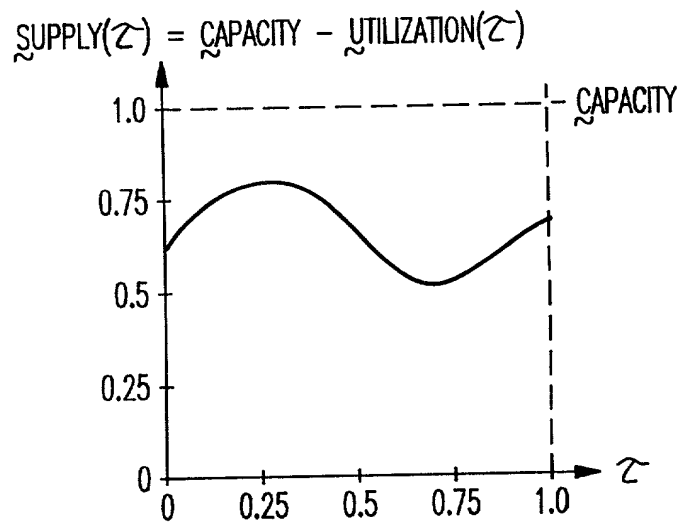


FIG.7D

$$\frac{d}{dz} \text{COST-OF-SUPPLY} = \text{SUPPLY}(z) \left\{ \begin{array}{l} \frac{d}{dz} \text{COST-OF-SUPPLY}(z) \uparrow \Rightarrow \downarrow \text{SUPPLY}(z) \\ \frac{d}{dz} \text{COST-OF-SUPPLY}(z) \downarrow \Rightarrow \uparrow \text{SUPPLY}(z) \end{array} \right.$$

FIG.7E

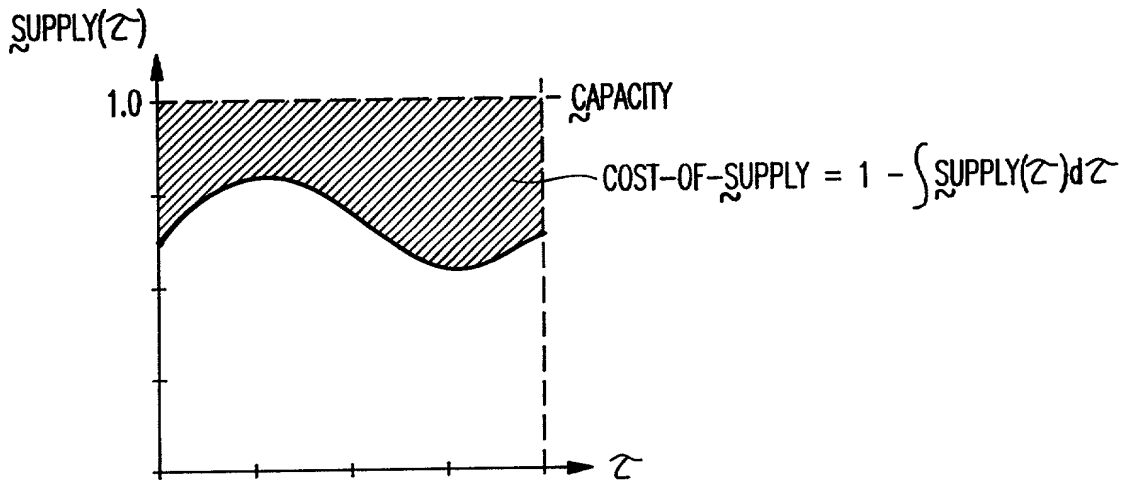


FIG.7F

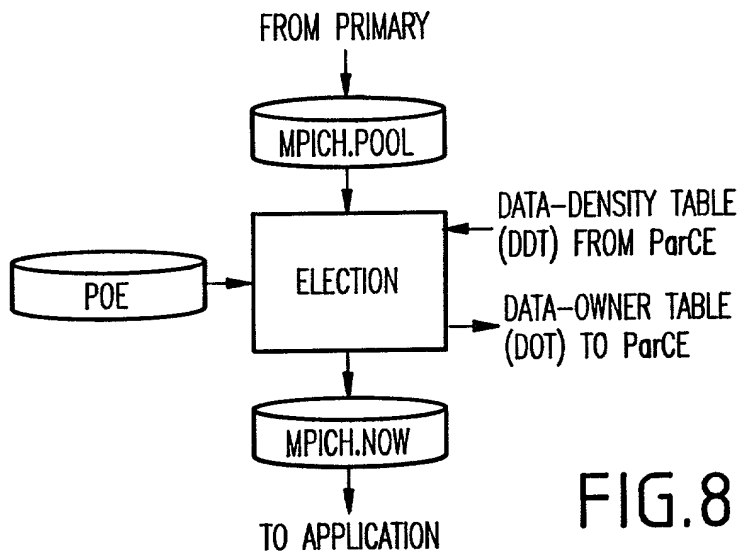


FIG.8

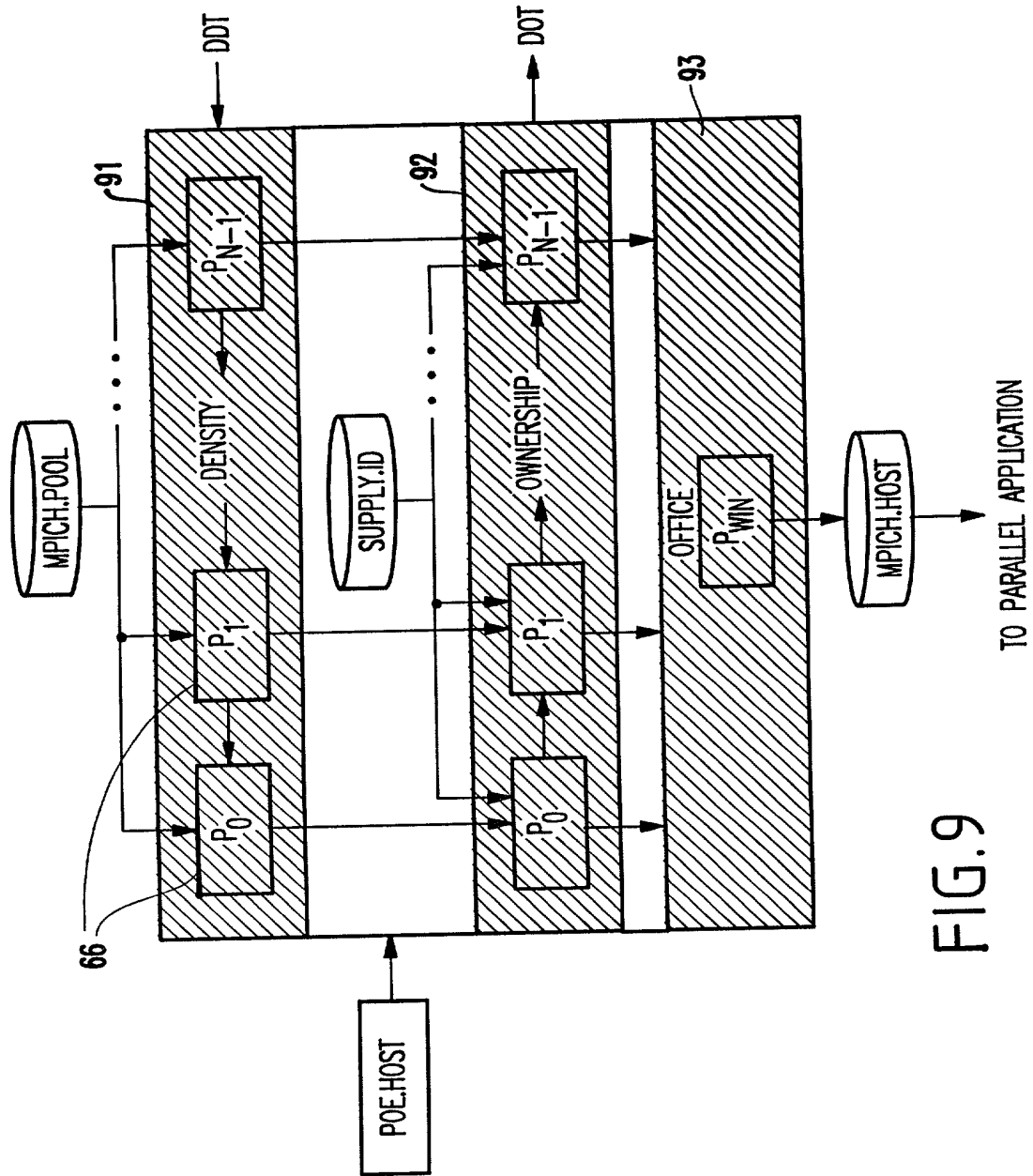


FIG. 9

FIG. 9

FIG. 10

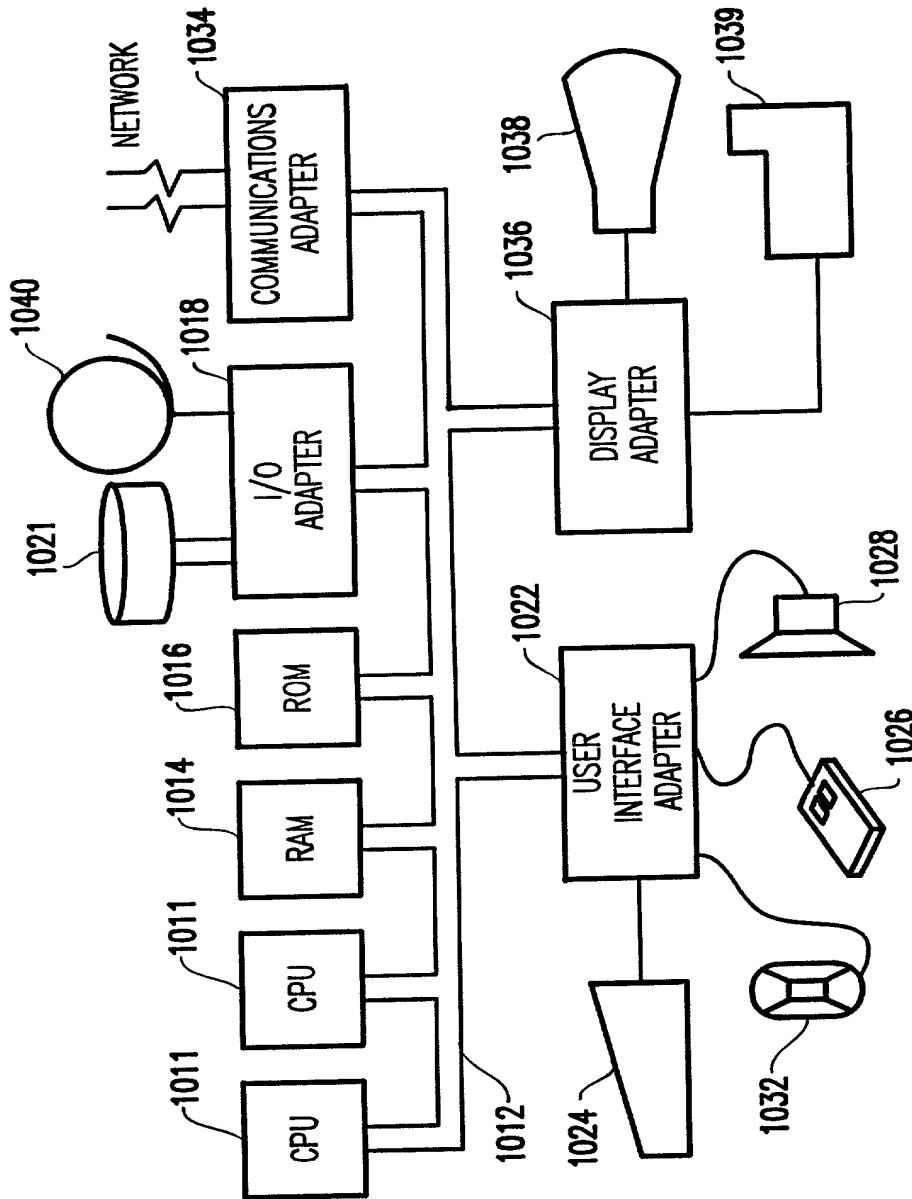


FIG. 11

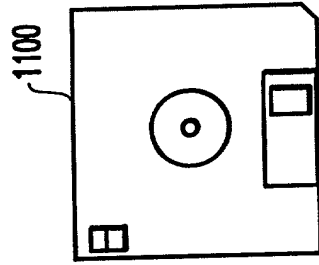


FIG. 10